Attachment E

In the Matter of	)	
	)	
Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers	)	CC Docket No. 01-338
	)	
Implementation of the Local Competition Provisions of the Telecommunications Act of 1996	)	CC Docket No. 96-98
	)	
Deployment of Wireline Services Offering Advanced Telecommunications Capability	)	CC Docket No. 98-147

DECLARATION OF RICHARD A. CHANDLER
On Behalf of WorldCom, Inc.

I. INTRODUCTION

1. My name is Richard Chandler. I am Senior Vice President of HAI Consulting, Inc. My qualifications are described in the HAI report filed with WorldCom's initial comments.

2. I have been asked to evaluate claims that companies will be able to deliver broadband services via satellite and compete with DSL and cable modem services. In public statements made by EchoStar's chairman, Mr. Charles Ergen, EchoStar claims to be able to support Internet access for very large numbers of households using existing Ka-band Fixed Satellite Service authorizations held by EchoStar and Hughes, its proposed merger partner.

3. In this declaration, I discuss the limits on the ability of companies to use satellites to offer competitive broadband services. First, and most important, I discuss the limits on

satellite capacity for two-way Internet access by estimating the ability of a combined EchoStar and Hughes to support Internet access for very large numbers of households. In addition, I discuss in greater detail limitations with respect to service quality and equipment that were described in the HAI report filed with WorldCom's Comments in this docket.

4. The following analysis estimates the total subscriber capacity of the merged entity's proposed broadband satellite platforms as authorized by the FCC for deployment over the next few years. The study concludes that, although the satellite-based service may be a useful alternate or even principal means of Internet access for a limited number of rural households, the merged entity's combined satellite capacity for two-way Internet access is far short of that required to serve even a majority of rural households, let alone a significant fraction of households nationwide.

II. ASSUMPTIONS

5. Mr. Ergen's statements regarding satellite capacity for two-way Internet access, contained in Senate testimony,[1] are somewhat ambiguous. Mr. Ergen states the following in his written testimony:

> Unlike wired technologies, such as DSL and cable modems, a satellite broadband platform can serve every household in the country, no matter how rural. Initially, the combined company will have the subscriber base and financial means to make our current satellite broadband offerings more affordable. Then, we will make next-generation satellite broadband service a reality for consumers everywhere in

[1] Charles W. Ergen, Chairman and Chief Executive Officer, EchoStar Communications Corporation, "Dominance in the Sky: Cable Competition and the EchoStar-Direct TV Merger," testimony before the United States Senate Committee on the Judiciary, Subcommittee on Antitrust, Competition, and Business and Consumer Rights, March 6, 2002 ("Ergen Testimony").

> the United States by deploying a new generation of satellites utilizing Ka-band spectrum.

This passage is unclear. It could be interpreted as stating that a satellite-based system can provide service to any subscriber location in the satellite's "footprint," or coverage area. This is essentially correct (with the qualification being that there will be a very small fraction of subscriber locations that do not have the necessary line-of-sight path to the satellite). If the claim instead is that the satellite-based system can provide service to all subscribers in the footprint, the statement is incorrect as it applies to the satellites that EchoStar/Hughes would launch and operate. These satellites will have nowhere near the capacity required for all households covered by the footprint nor will the system be able to serve more than a fraction of the forty million rural households cited elsewhere in Mr. Ergen's testimony.[2]

6. Mr. Ergen's statements and exhibits do not identify the particular satellites or the particular class of satellite service (*e.g.*, FSS, or Fixed Satellite Service) and frequency allocation that would be used to support the two-way Internet access service he describes. We have therefore had to make a number of assumptions, based on merger documents and various FCC pleadings by EchoStar, Hughes, and others, in these areas.

7. In his testimony, Mr. Ergen, in describing one of his exhibits, states that "[t]he 18 x 22 inch dish you see in this photo will enable customers to receive signals from the merged company's three orbital slots." We will assume that he refers to the 99, 101, and 103 degree west longitude slots (abbreviated as WL). The 99 and 101 WL slots are assigned to Hughes Network Systems for their Spaceway 99 and Spaceway 101 satellites,

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[2] *Id.*, Attachment B.

and PanAmSat has the 103 WL slot. We further assume that the merged company would populate each slot with two satellites of a common design based on the Spaceway spacecraft.[3] All six satellites would operate in 500 MHz of spectrum on each of the uplinks and downlinks, and each would carry 24 transponders of 500 MHz bandwidth, thus allowing, at least theoretically, twenty-four times reuse of the assigned spectrum per satellite.[4]

8. Note that full reuse of the spectrum is possible only if there is a hub location effectively dedicated to each transponder (because each transponder can transmit the entire allocated spectrum).[5] This means that six identical satellites would require 24 x 6 or 144 independent hub stations to terminate each "use" of the entire spectrum.

III. CAPACITY ESTIMATES

9. We will consider the single-satellite capacity in terms of the number of subscribers it can serve for Internet access. We will also assume QPSK (quadrature phase shift keying) as the digital modulation technique in both directions. QPSK is a well-proven and spectrally-efficient digital modulation format widely-used in wireless and other types of communications systems.

10. We estimate the per-satellite subscriber capacity as follows:

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[3] This assumption is quite liberal and is consistent with one made by Walter Morgan. *See* Declaration of Walter L. Morgan in Support of Petition to Deny by the National Rural Telecommunications Cooperative, CS Docket No. 01-348, In the Matter of Application of EchoStar Communications Corporation, General Motors Corporation, and Hughes Electronics Corporation For Consent For Proposed Transfer of Control, February 2, 2001, ("Morgan Declaration"), at p 37.

[4] We also assume that the entire 500 MHz at Ka band is used for Internet access.

[5] The hub station serves as the gateway to the Internet. It "funnels" transmissions from subscribers into a terrestrial transmission facility connected ultimately to the Internet.

i. With a practical bandwidth efficiency for QPSK of 1.6 bps/Hertz, and a rate-3/4 convolution coder for forward error correction, and twenty-four transponders each with 500 MHz bandwidth (and hence a total available bandwidth of 12 GHz, assuming full reuse as noted earlier), the overall gross end-to-end bit rate is

12 GHz x 1.6 bps/Hertz x 0.75 = 14.4 Gbps.

ii. Allowing for packet overhead of 0.10, a (liberal) multiple-access efficiency of 0.85, and a bandwidth allowance of 0.10 for guardbands, the effective end-to-end total bit rate is

14.4 Gbps x (1 – 0.10) x 0.85 x (1 – 0.10) = 9.91 Gbps.

We round this up to 10 Gbps for ease of discussion. This number is similar to that obtained by Mr. Morgan,[6] and Hughes claims a 10 Gbps per-satellite transmission capacity in a Minor Modification filed on December 21, 2001, with regard to the the Spaceway application.[7]

iii. If we assume symmetric bit rates of 256 kbps per subscriber and an average oversubscription ratio of 30:1,[8] and that one-half of all subscribers are

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[6] Morgan Declaration at p 38.

[7] Application for Minor Modification In Re Application of Hughes Communications Galaxy, Inc. for Minor Modification of Authorization to Launch and Operate the Spaceway™ GSO FSS Satellite System at 99^0 and 101^0 West Longitude. Call signs: s2132, s2133, December 21, 2001.

[8] The oversubscription ratio quantifies the assumption that typical Internet usage is "bursty," and that subscribers will only occasionally attempt a transmission. The value chosen may be interpreted as meaning that, on the average, one subscriber out of thirty will actively transmit or receive at any instant.

active, or "logged in" to their ISPs at any given time, the total number of subscribers served by a single satellite is

10 Gbps ÷ 256 kbps/subscriber x 30 ÷ 0.5 = 2.34 million subscribers.

iv. The entire set of six satellites thus has a total capacity of

2.34 million x 6 = 14 million total subscribers.

11. This total is far smaller than the 40 million rural households noted in Mr. Ergen's Senate exhibit. Even the somewhat more liberal assumptions regarding subscriber behavior used in Mr. Morgan's analysis lead to subscriber totals of between about 11 million and 22 million for the three orbital slots in question, or barely 50% of rural households at best.[9]

12. It is worth emphasizing that the limits to subscriber capacity are "soft." More subscribers than our estimated 14 million could be served if the oversubscription rate were increased but at a cost of degraded service quality. Increased oversubscription leads to increased delay, because the higher demand at any instant causes the subscriber terminals to queue their transmissions for longer periods before the system can handle their service requests.[10]

13. We base our overall capacity estimate on performance parameters consistent with those usually associated with ADSL service to allow a common basis of comparison. Although considerably larger user populations might be served, the overall service level

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[9] Morgan Declaration, Table 14.

[10] Although the limits are "soft," they are real. At extreme levels of demand, queueing delays can be long enough that the temporary storage buffers in the subscriber equipment overflow, thus losing subscriber data.

would be markedly reduced, and the claim could no longer be made that the satellite-based service is equivalent to cable- or ADSL-based Internet access.

IV. SERVICE QUALITY

14. Satellite-based service at the frequencies in question (roughly 18 – 30 GHz) is much more susceptible to signal fading caused by rainfall than is, say, MMDS service, which is essentially unaffected by rainfall. The scattering of radio signals by rain typically becomes significant at frequencies above about 10 GHz, and the slant paths over which satellite communications systems operate can be even more susceptible to rain fading than are terrestrial paths. Even a system claiming 99.5% availability will suffer average outages totaling nearly two entire days per year. Landline systems, including coaxial cable and telephone plant, are obviously immune to this sort of weather-related outage and are generally much more reliable than satellite systems.

V. EQUIPMENT INVESTMENT

15. Subscriber equipment for a satellite-based two-way Internet access network will almost certainly always be more expensive than that required for ADSL or cable modem service, for the simple reason that more components are required at the customer's premises. In the case of ADSL, for example, the customer premises modem is typically a single small (roughly three by five inches) circuit board mounted in a personal computer using a standard PCI interface, and the DSLAM (digital subscriber line access multiplexer) to which it is connected in the ILEC network is a similarly compact and

straightforward device. ADSL modems are widely available at retail for well under $100 in single quantities.[11] These modems are also installed by the subscriber.

16. A home satellite terminal, on the other hand, must include an outdoor antenna (typically a reflector, or dish, although other designs could be used), radio-frequency circuitry for transmitting and receiving signals, as well as the modem function itself and cabling from the exterior equipment to the devices mounted indoors. Current retail prices for two-way satellite terminals for DirecTV's DIRECWAY internet access are about $700, and a $200 professional installation is also required.[12] Service providers often subsidize subscriber equipment, and, in the present example, DirecTV offers a $300 equipment discount. Although per-unit manufacturing costs will decrease with greater production volume, this equipment will always be significantly more expensive than that required for ADSL or cable modem service.

VI. CONCLUSIONS

17. This analysis is not intended as an indictment of high-speed satellite-based Internet access. There is no doubt that such a system could be very useful in extending advanced data services to residents and perhaps small businesses in remote areas which might otherwise be unserved by anything beyond basic switched voice telephone service. The estimated subscriber capacity may also be sufficient to support a profitable business case for the satellite operator, but such an analysis is well beyond the scope of this report.

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[11] *See, e.g.*, http://www.us.buy.com/retail/product.asp?sku=10256698&loc=101.

[12] *See* http://www.americansatellite.com/products/viewdetails.asp?SID=OICG0G3154010L8HTMY3ZBF87ZU4D3QZF&ITEM=553.

18. It is clear that satellite-based Internet access as proposed and discussed by EchoStar will only address a very narrow market segment and in no way can be viewed as a serious competitor to ILEC (or cable operator) landline-based high-bit-rate services.[13] It cannot compete either on the basis of service quality or subscriber equipment cost. The service cannot be made to be as reliable as more conventional services such as those supported by cable modems, xDSL equipment on standard telephone loops, and even such terrestrial radio technologies as MMDS. Subscriber equipment is and will continue to be far more expensive than that for the landline services.

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[13] The Commission's International Bureau revoked on June 28, 2002, an authorization issued to EchoStar in 1997 to construct, launch, and operate a satellite carrying Ka-band transponders. *In the Matter of EchoStar Satellite Corporation, Application for Authority to Construct, Launch, and Operate a Ka-band Satellite System in the Fixed-Satellite Service,* File Nos. 167-SAT-P/LA-95 168-SAT-P/LA-95 54-SAT-AMEND-96 SAT-MOD-20010608-00055, Memorandum Opinion and Order, DA 02-1534 (rel. July 1, 2002). EchoStar's failure to meet the specified construction deadline calls into question its commitment to satellite-based Internet access service.

Declaration

I declare under penalty of perjury that the foregoing is true and correct.

Executed on July 8, 2002.

Richard A. Chandler

Attachment F

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers	)	CC Docket No. 01-338
	)	
Implementation of the Local Competition Provisions of the Telecommunications Act of 1996	)	CC Docket No. 96-98
	)	
Deployment of Wireline Services Offering Advanced Telecommunications Capability	)	CC Docket No. 98-147

JOINT DECLARATION OF TOM STUMBAUGH, DAVID REILLY, AND WILLIAM M. DRAKE ON BEHALF OF WORLDCOM, INC.

I. INTRODUCTION AND PURPOSE

1. My name is Tom Stumbaugh and I am employed by WorldCom as Manager II, Tier III Support, WorldCom OnNet DSL. My business address is 9100 East Mineral Circle, Englewood, CO 80112. My principal duties involve leading the engineering team responsible for researching and implementing DSL Access Technology for WorldCom's OnNet DSL Network. I provided my qualifications and prior business experiences in a previous declaration.

2. My name is David Reilly and I am employed by WorldCom as a Network Engineer. My business address is 9100 East Mineral Circle, Englewood, CO 80112. My duties include

layer 1 design rules and loop qualification testing used by WorldCom for deploying DSL services in the US. I provided my qualifications and prior business experiences in a previous declaration.

3. My name is William M. Drake and I am employed at WorldCom as an Advisory Engineer. I have worked for WorldCom for 14 years. My principal responsibilities include evaluation of new technologies and services, including line sharing and line splitting on fiber-fed digital loop carrier systems, and consulting with WorldCom representatives on the ANSI, ETSI and ITU industry standards bodies.

4. The purpose of this declaration is to respond to, and correct, a number of misimpressions created by SBC Communications, Inc. ("SBC") and Verizon Communications, Inc. ("Verizon") in their opening comments in this proceeding. Specifically, we will explain that from a technical perspective, 1) it is technically feasible to unbundle Project Pronto loops and subloops; 2) SBC and Verizon must deploy fiber-fed Next-Generation Digital Loop Carrier ("NGDLC") systems in order to cut expenses, increase network efficiencies and capacity, and increase the reach of high revenue broadband services such as xDSL-based offerings; 3) fiber-fed NGDLC networks are the basic network platform of ILECs on a going-forward basis for both narrowband and broadband services, and are not so-called overlay networks; 4) from a technical perspective, CLECs need access to UNE loops on fiber-fed NGDLC platforms, and the decision of ILECs to support the fiber portion of such UNE loops with packet switching does not alter the analysis; 5) there is no basis for ILEC claims that CLEC access to fiber-fed NGDLC architectures on an unbundled basis creates stranded capacity; and 6) from a technical perspective, CLECs have no alternative to

the ILECs' networks to support the range and scope of broadband services that CLECs want to offer consumers.

5. This declaration supplements two prior joint declarations we submitted on October 12, 2000 ("DLC Declaration"), and on April 5, 2002 ("Stumbaugh/Reilly Declaration"), both of which have been incorporated into the record of this proceeding.[1]

II. UNBUNDLING PROJECT PRONTO IS TECHNICALLY FEASIBLE

6. SBC initially planned to offer the network components of Project Pronto as UNEs. SBC gave a presentation to CLECs on March 1, 2000 in Dallas, Texas, stating that the "Project Pronto unbundling plan is a work effort within the Wholesale Marketing division of SBC to provide unbundled access to the infrastructure being deployed under Project Pronto. The infrastructure itself will belong to the SBC Telcos and will be provided on a leased basis to CLECs."[2] The presentation described the various UNEs that SBC intended to make available to CLECs, including (1) a UNE subloop from the NID [network interface device at customer premises] to the SAI [serving area interface]; (2) DLE ADSL UNE Feeder loop

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1 *In the Matters of Deployment of Wireline Services Offering Advanced Telecommunications Capability and Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Joint Declaration of Martin Garrity, David Reilly, Tom Stumbaugh and Rob Williams on Behalf of Rhythms NetConnections Inc. and Rhythms Links Inc.*, CC Docket Nos. 98-147 and 96-98, (dated Oct. 10, 2000) ("DLC Declaration") (attached to comments of Rhythms NetConnections Inc., dated Oct. 12, 2000); Joint Declaration of Tom Stumbaugh and David Reilly on Behalf of WorldCom, Inc., Docket Nos. 01-338, 96-98, and 98-147, (dated April 2, 2002) ("Stumbaugh/Reilly Declaration") (attached to WorldCom's comments dated April 5, 2002).

2 *Rulemaking on the Commission's Own Motion to Govern Open Access to Bottleneck Services and Establish a Framework for Network Architecture Development of Dominant Carrier Networks/Investigation on the Commission's Own Motion into Open Access and Network Architecture Development of Dominant Carrier Networks* ("CA Line Sharing Proceeding"), R.93-04-003/I.93-04-002, Boyer Cross Exh. 93, March 2000, at Bates 500104, attached to Letter from Kimberly Scardino, WorldCom, to Secretary Dortch, CC Docket No. 01-338,

from the port termination at the NGDLC to the OCD Port; and (3) OCD Port Termination (The OCD is an ATM switch used as a router on which DSL traffic terminates at the central office).[3] Clearly, SBC believed at the time it rolled out Project Pronto that the fiber-fed NGDLC architecture could be unbundled.[4]

7. In addition, SBC witnesses have verified under oath in Project Pronto proceedings in several states that SBC initially intended to offer Project Pronto to CLECs as UNEs. SBC witness Mr. Chris Boyer testified in the California line sharing proceeding that he wrote Marketing Service Descriptions ("MSDs") which described offering CLECs access to Project Pronto as UNEs, including end-to-end loops and subloops via the NGDLC line cards. These MSDs also discussed allowing CLECs to own the NGDLC line cards, and to collocate them either through a pooling arrangement, or on an individual basis.

8. Despite SBC's and Verizon's strong opposition to CLEC ownership and collocation of line cards, such an arrangement is technically feasible, and will be necessary for CLECs to differentiate their products, if the ILECs are unwilling to unbundle all of the components of fiber-fed NGDLC networks and support *all* of the features and functions of these platforms. SBC's own internal technical personnel at one time planned to allow CLEC card ownership and collocation.

9. Dr. Neil Ransom, Alcatel's Chief Technology Officer, has acknowledged in state line sharing proceedings in Illinois, California, and Indiana that if CLECs purchase line cards

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dated July 17, 2002, as Attachment 5 (*Project Pronto Overview*).

[3] *Project Pronto Overview,* at Bates 500122.

[4] *Project Pronto Overview,* at Bates 500104 ("SBC will unbundle access to the network

manufactured or licensed for manufacture by Alcatel, the cards will work in the Litespan NGDLC equipment deployed by SBC (and Verizon).[5] Alcatel already has a program in place to license other manufacturers to produce xDSL line cards. Pursuant to this program, ADC and ADTRAN are manufacturing HDSL2 cards for the Litespan NGDLC.[6] Thus, so long as CLECs are allowed only to collocate cards manufactured, or licensed for manufacture, by Alcatel, any technical problems raised by SBC associated with "non-approved" line cards are eliminated.

10. From a technical perspective, the loops that SBC would provision for CLECs are the same underlying facilities regardless of whether the loop is offered as a service or a UNE. In state line sharing proceedings including those in Illinois, Texas, and Wisconsin, regulators concluded that unbundling Project Pronto on an end-to-end loop basis is technically feasible. Therefore, we believe that SBC's resistance to offering Project Pronto as UNEs has no technical basis. In fact, SBC's own chief technology officer testified in Illinois and California that the reason he didn't want to unbundle Project Pronto was not due to technical infeasibility, but because he feared "losing control" of the network.

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elements as defined by the DLE infrastructure").

5 *See, e.g.,* CA Line Sharing Proceeding, Hearing Tr. (Ransom), at 13055-57, attached to Letter from Kimberly Scardino, WorldCom, to Secretary Dortch, CC Docket No. 01-338, dated July 17, 2002, as Attachment 6.

6 Alcatel Press Release, "Alcatel Teams with ADC and ADTRAN to support TDM-based HDSL2 Solutions on Industry-Leading Litespan Platform," March 27, 2001, attached to Letter from Kimberly Scardino, WorldCom, to Secretary Dortch, CC Docket No. 01-338, dated July 17, 2002, as Attachment 7.

He said that even if it didn't cost any extra money to unbundle Project Pronto, he would recommend against it.[7]

11. Based on industry presentations to CLECs in New York and California, Verizon is deploying a fiber-fed NGDLC network architecture exactly the same as SBC's Project Pronto network design, and is using the same two NGDLC vendors (Alcatel and Advanced Fibre Communications). Therefore, it is just as technically feasible for Verizon to offer its fiber-fed NGDLC network platform as UNEs as it for SBC to do so. Like SBC, however, Verizon is unwilling to offer unbundled access to hybrid fiber and copper loops or subloops on its fiber-fed NGDLC architecture. Verizon has offered no technical basis to support its refusal, other than the same unfounded claims made by SBC. Thus, Verizon should also be required to offer CLECs UNE access to its PARTS platform.

III. SBC'S THREATS TO CEASE DEPLOYING PROJECT PRONTO ARE NOT CREDIBLE FROM A TECHNICAL PERSPECTIVE

12. Given the current state of technology, ILECs such as SBC and Verizon must turn to fiber-fed NGDLC architectures to cut costs, improve network efficiency and capacity, and to extend the reach of high revenue broadband services to a greater segment of their customer base. Therefore, we do not believe that either SBC or Verizon can delay deploying fiber-fed DSL-capable NGDLC networks indefinitely. As we discussed in the Stumbaugh/Reilly Declaration, ILECs are moving rapidly to deploy fiber-fed NGDLC in their networks, and SBC and Verizon recently announced accelerated efforts to deploy such platforms.

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[7] CA Line Sharing Proceeding, Hearing Tr., at 12861-63; IL Rehearing Tr., at 298-314, attached to Letter from Kimberly Scardino, WorldCom, to Secretary Dortch, CC Docket No. 01-338, dated July 17, 2002, as Attachments 8 and 9.

13. The fiber-fed NGDLC loop architecture is superior because it replaces a portion of long copper loops, which limit or preclude the use of DSL, are expensive to maintain and are prone to technical problems created by environmental factors such as moisture. Moreover, the expected service life of the fiber loop facilities is as long or longer than copper loop facilities. These factors make hybrid copper/fiber loops much less costly than all-copper loops. Fiber-fed NGDLC loops are also superior in that they support higher bandwidths and are more easily upgraded to higher capacity simply by installing higher bit rate electronics. Given the dramatic cost savings possible through the use of fiber-fed NGDLC systems, SBC told shareholders in 1999 that Project Pronto would pay for itself in cost savings alone. SBC also told shareholders that Project Pronto cost savings, coupled with new revenue from broadband services, were expected to generate in excess of $10 billion NPV [net present value].[8] Therefore, based on the technical and economic realities of today's telecommunications market, we do not believe that SBC can afford to halt deployment of Project Pronto.

14. SBC will be able to double the number of customers who can receive DSL service, from 40 percent to 80 percent, by deploying Project Pronto. This increase is due to the fact that DSL-based services are distance sensitive; the longer the loop, the lower the transmission speed of DSL that can be supported on the loop. At about 20,000 feet, an all-copper loop can no longer support most types of DSL. By deploying fiber in the feeder portion of the loop, however, DSL can be provided to customers at distances beyond the

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[8] SBC Investor Briefing at 11 (Oct. 18, 1999) < www.sbc.com >, attached to Letter from Kimberly Scardino, WorldCom, to Secretary Dortch, CC Docket No. 01-338, dated July 17, 2002, as Attachment 3.

reach of all-copper loops. Deploying fiber also allows the ILEC to support higher throughput rates for DSL. Future broadband services such as video will require these higher DSL transmission rates.

15. Given these compelling technical reasons to deploy fiber-fed DSL-capable NGDLC, SBC has notified CLECs that it is again deploying Project Pronto even in areas where it had stopped deployment for regulatory reasons. SBC had told regulators in Illinois that it had ceased deploying Project Pronto, and would not resume if it had to unbundle Project Pronto, even as an end-to-end UNE loop. In May 2001, the Illinois Commerce Commission ordered SBC to give CLECs access to UNE loops configured over the Project Pronto architecture. On April 19, 2002, SBC notified CLECs in an Accessible Letter that it is resuming deployment of Project Pronto. The state commissions in Texas and Wisconsin have also ordered SBC to provide end-to-end UNE loops over the Project Pronto architecture, but to the best of our knowledge, SBC has not stopped deploying Project Pronto in either state.

16. Verizon is also proceeding with deployment of fiber-fed NGDLC to support DSL at the RT in its network. Later this year, Verizon intends to offer an initial roll out of PART service (Verizon's name for DSL at the RT service – acronym for "Packet At the Remote Terminal") in Massachusetts. Verizon's Project Manager for PART service testified in depositions conducted as part of the California line sharing proceeding that the initial deployment is not a trial, and will be offered to "provid[e] retail revenue generating services from those locations and customers served by that deployment."[9]

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[9] CA Line Sharing Proceeding, Verizon deposition transcript, March 4, 2002, Volume 1, at 258:21-24; 259:2-15, attached to Letter from Kimberly Scardino, WorldCom, to Secretary Dortch, CC Docket No. 01-338, dated July 17, 2002, as Attachment 10.

IV. SBC'S DESCRIPTION OF PROJECT PRONTO AS AN OVERLAY NETWORK HAS NO TECHNICAL BASIS

17. SBC's description of Project Pronto as an "overlay" network has no technical basis. As described above, hybrid fiber/copper loops are more cost effective and efficient than are all-copper loops. From an outside plant engineer's perspective, it makes little economic sense to operate two parallel loop plant networks (*i.e.*, fiber-fed NGDLC and home run copper) for any significant period of time. To do so would prevent the ILEC from fully realizing the maintenance savings and lower unit cost of capacity expansion associated with the fiber-fed NGDLC loop architecture. Indeed, the ILEC's total costs would increase because of the need to maintain two loop plant networks. Whether it happens this year or in the near future, ILECs such as SBC and Verizon will have to use the fiber-fed NGDLC loop network as their only loop network in the areas they serve. Therefore, the ILECs have a strong incentive to deploy this network architecture and then retire long all-copper loops.

18. Rather than an overlay, the fiber-fed NGDLC platforms are actually the next step in a continuous modernization process by the ILECs underway since the 1970s, when ILECs began deploying pair gain, or loop carrier, systems in the loop plant. These systems "gained" pairs by multiplexing the voice grade signals from a number of end users, and then carried the multiplexed signal on a smaller number of feeder pairs. Digital Loop Carrier ("DLC") systems were the next example of a network upgrade. The DLC loop architecture consists of an RT containing DLC equipment, copper twisted pairs that extend from the RT to customer premises, and multiplexed pair-gain copper or fiber facilities between the RT and the CO. This DLC equipment was deployed to address operational issues such as feeder pair relief. DLC systems made it possible to economically serve subscribers far from the CO. The next

network upgrade was the deployment of "next generation" DLC ("NGDLC") systems in the 1980s. NGDLC systems use the DLC loop architecture, but add the GR-303 digital switch interface, which supports a greater number of lines per RT. Most recently, as exemplified by SBC's Project Pronto, ILECs began upgrading their NGDLC equipment to support high-bandwidth DSL. Thus, the Project Pronto and PARTS network architecture is more accurately viewed as a basic network upgrade than as a special function "overlay" network.

V. SBC AND VERIZON'S CLAIMS THAT UNBUNDLING THEIR NETWORKS IS TOO EXPENSIVE ARE COMPLETELY UNFOUNDED

19. Both SBC and Verizon claim that it would be too expensive for them to unbundle their fiber-fed NGDLC architectures and offer the components to CLECs as UNEs. For example, SBC claims that it has had to spend $200 million on OCD deployment, which SBC claims would not otherwise have been necessary, and $107 million on splitter deployment. SBC does not provide any cost support for these figures, so it is difficult to verify them. However, as a technical matter, it appears to us that SBC's claims are misleading.

20. For example, SBC's estimates of its expenditures for OCDs to the Commission are double the figures that SBC reported to the Indiana Commission.[10] While such a large discrepancy is troubling in and of itself, the misleading nature of SBC's argument is even more troubling.

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[10] *In the Matter of the Commission Investigation and Generic Proceeding on Ameritech Indiana's Rates for Interconnect, Service, Unbundled Elements, and Transport and Termination Under the Telecommunications Act of 1996 and Related Indiana Statutes*, Indiana Utility Regulatory Commission Cause No. 40611-S1 (Phase 2), Direct Testimony of Christopher J. Boyer, at 2 (Feb. 8, 2002), attached to Letter from Kimberly Scardino, WorldCom, to Secretary Dortch, CC Docket No. 01-338, dated July 17, 2002, as Attachment 11.

21. Without some sort of ATM routing device in the CO, *all* ATM traffic would necessarily have to be routed to a single carrier, and all other carriers would be pure resellers of that carrier's service. Given SBC's (and Verizon's) repeated statements that they are deploying their DSL-capable fiber-fed NGDLC architectures for Internet access, this also means that SBC (and Verizon) would route *all* ATM traffic to their chosen ISP (*i.e.*, in SBC's case, SBC Internet Services[11]). Thus, absent an ATM routing device in the central office, all other carriers would be mere resellers of a single ISP's services (assuming that other carriers could even obtain ILEC ISP service for resale).

22. Moreover, even focusing on SBC's wholesale broadband service (and Verizon's PART service), SBC's argument makes no engineering sense. SBC itself has (correctly) stated that it needs an ATM switch/OCD in the central office itself in order to offer its wholesale broadband service. Thus, whether access to the Project Pronto or PARTS architecture is available as a service or as a UNE(s), SBC and Verizon must install ATM routing devices in their central offices. It is therefore incorrect from a technical perspective to claim that OCD expenditures are, or were, somehow caused by a requirement to offer unbundled access to the Project Pronto and PARTS architecture.

23. Further, SBC chose to install an OCD that is a large carrier class ATM switch,[12] which has substantially more capacity than necessary from a technical perspective, and therefore is more costly than was necessary to route ATM-based DSL traffic to CLECs.

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[11] *See, e.g.*, http://www.sbc.com/products_services/ ("SBC is America's leading provider of high-speed DSL Internet access service, and one of the nation's leading Internet Service Providers (ISPs)").

[12] SBC is installing the Lucent CBX 500 ATM switch.

24. As with SBC's claimed costs for OCDs, SBC does not provide any cost support for its supposed expenditures for splitters. It also does not provide any technical or operational explanation of the make up of these costs. For example, SBC does not explain what portion of these costs is attributed to CO-based splitters versus splitter functionality deployed as part of the NGDLC in RTs. SBC also does not explain what portion of the splitter costs it would have incurred for its own operations.

25. Finally, we note that similar cost claims SBC has made to state commissions regarding unbundling Project Pronto have been completely discredited. For example, SBC claimed in Illinois that it would cost more than $500 million to comply with the Commission's order to unbundle the components of Project Pronto as UNEs. However, after analyzing SBC's so-called "cost study" it became apparent that the cost estimates were unsupported, misleading and technically incorrect. SBC's Project Pronto costing expert admitted in Illinois and California that his cost estimates were not based on a structured cost study, but rather were merely an informal analysis. [13]

26. The Illinois Commerce Commission, which has spent the last two years examining issues and evidence relating to line sharing on the Project Pronto architecture, including unbundling, rejected SBC's "doomsday 'cost analysis'" finding it to be "simply a

[13] Ameritech-Illinois' Testimony of James E. Keown, Attachment JEK-4, Illinois Commerce Commission, Proposed Implementation of High Frequency Portion of Loop (HFPL)/Line Sharing Service Docket No. 00-0393 (Rehearing); IL Rehearing Tr. (Keown) at 2178-2264, particularly 2184, 2202, 2263-64; and Pacific Bell's Testimony of James E. Keown, Attachment JEK-4, California Public Utilities Commission R.93-04-003/I.93-04-002 (Line Sharing Phase); CA Hearing Tr. (Keown), at 15486-89. SBC's witness in California, Mr. Keown, stated under oath that the assumptions underlying the "cost analysis" he submitted for California are identical to those he submitted in Illinois. *See* CA Hearing Tr. (Keown), at 15486-89.

teleological endeavor designed to produce the highest possible costs of compliance imaginable, untempered by anything remotely resembling a dose of reality."[14]

VI. ADDITION OF PACKET SWITCHING CAPABILITIES TO DLC PLATFORMS DOES NOT ALTER CLECS' NEED TO ACCESS END-TO-END UNE LOOPS TO PROVISION BROADBAND SERVICES FOR CUSTOMERS

27. As we discussed above, fiber-fed NGDLC systems have been deployed as a basic network upgrade that has been used to support voice and other services for several years. The only real difference between the Project Pronto NGDLC deployment and these earlier NGDLC deployments is the addition of the ability of the system to process ATM packets. In the Project Pronto and PART architectures, data transmissions are carried on the fiber portion of the loop via ATM packets. However, the addition of ATM packet switching on the fiber portion of the loop does not change CLECs' need for access to an end-to-end loop to provision DSL-based services for customers.

VII. UNBUNDLING FIBER-FED NGDLC SYSTEMS WILL NOT RESULT IN STRANDED CAPACITY OR CAPACITY RESTRAINTS ON ILEC NETWORKS

28. ILECs such as SBC claim that CLECs should be barred from owning and collocating NGDLC line cards based on an incorrect assertion that CLEC collocation of line cards would prematurely exhaust the NGDLC's capacity because, at any given time, the CLEC card might not be fully utilized. However, such purported "stranded" capacity issues have no basis in technical reality.

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[14] Illinois Order on Rehearing, at 36, attached to Letter from Kimberly Scardino, WorldCom, to Secretary Dortch, CC Docket No. 01-338, dated July 17, 2002, as Attachment 1.

29. One such "stranded capacity" argument raised by SBC is that allowing CLEC collocation of line cards, which can have as many as four ports, would "strand" unused ports and supposedly cause premature exhaust of card slots. However, SBC's own technical personnel identified a technical fix -- card pooling. In such an arrangement, CLECs would own line cards, but would give them to the ILEC for installation and maintenance. The CLEC would be given a port credit equal to the number of ports on the cards it gives to the ILEC. Such cards could be filled in sequence with the next DSL order placed, and thus would eliminate any "stranded" capacity or slot exhaust concerns. Indeed, such card pooling arrangement causes significantly less "stranded capacity" than the ILECs' own standard practice of deploying line cards in bulk, in advance, to meet between six months and one year of demand. This means that ILECs may deploy hundreds of line cards in advance, which remain unused for many months.

30. Another arrangement that fully addresses the "stranded capacity" and administrative concerns that SBC raises in regard to CLEC collocation of line cards is virtual collocation. In a virtual collocation arrangement, CLECs would purchase line cards for an ILEC's NGDLC, but would sell the cards to the ILEC for a nominal amount such as $1. SBC would then manage the CLEC line cards (including providing maintenance services) as part of its own inventory. SBC witness Chris Boyer has testified before state regulators that virtual collocation would be beneficial by allowing CLECs to purchase new line cards that support new features and functions, while eliminating SBC's concerns about coordinating line card placement and maintenance.[15]

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[15] California Line Sharing Proceeding, R.93-04-003/I.93-04-002, Hearing Tr. (Boyer), at

31. Even assuming there may be some unused line card capacity in ILEC networks due to CLEC-owned or ILEC pre-provisioned line cards, such unused capacity does not pose a serious exhaustion concern due to the relatively low projected take rates for DSL and the relatively large number of DSL line cards that can be installed in the NGDLC equipment being deployed by the ILECs. Even the highest take rates for DSL projected by ILECs (which we cannot disclose here because the ILECs insist that such information be kept under seal in state proceedings) would utilize only a small amount of the total capacity of NGDLCs and line cards. For example, Alcatel's Chief Technology Officer recently testified in an Indiana UNE and line sharing proceeding that its Litespan NGDLC (used by both SBC and Verizon) can support 1100 DSL lines in the smallest RT cabinet housing available. The confidential ILEC-projected take rates for DSL would fill only a fraction of the line card ports in the NGDLC. Thus, the substantial line card capacity of current NGDLC to support DSL far exceeds projected demand for years to come, and eliminates any concerns about premature exhaustion of NGDLC line card capacity.

32. SBC's claims that allowing CLECs access to the full set of features and functions of the NGDLC platform will exhaust network capacity are also incorrect. For example, SBC has argued that allowing CLECs to access a private virtual path ("PVP"), as opposed to the private virtual circuit ("PVC"), which uses only a small portion of the PVP capacity, would exhaust the capacity of NGDLC.[16] This claim is based on the now-superseded Release 10 of

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15265-15266:8, attached to Letter from Kimberly Scardino, WorldCom, to Secretary Dortch, CC Docket No. 01-338, dated July 17, 2002, as Attachment 12.

[16] The advantage of the PVP over the PVC is that the bandwidth of the PVP can be managed dynamically to support a variety of services.

Alcatel's Litespan NGDLC software, which supports only one PVP per Channel Bank Assembly ("CBA"). Thus, SBC claims that if a CLEC were allowed to purchase a PVP, it would exhaust the capacity of the entire CBA. However, SBC ignores the fact that Alcatel upgraded its Litespan system software to Release 11, which will support 64 PVPs between each Channel Bank Assembly in the RT and the central office.

33. SBC also claims that allowing CLECs to purchase PVPs as UNEs will exhaust the capacity of the OCD. Allowing CLECs to purchase a PVP rather than PVCs greatly reduces the load and complexity of the UNE provided to CLECs since the OCD would only have a single PVP connection for all of a particular CLEC's PVCs, rather than a PVC connection for each of the CLEC's circuits. Moreover, the PVP connection minimizes the management of the OCD since there is only a single connection per CLEC rather than multiple connections with varying quality of service ("QoS") per CLEC circuit. In addition, the capacity of OCDs can easily be augmented if the original OCD is exhausted. An OCD only occupies roughly half the vertical space of a single equipment bay. If the capacity of the first installed OCD is reached, additional OCDs can be easily installed. SBC's Project Pronto expert Mr. James Keown testified in California that SBC has already tested configurations of multiple OCDs.[17] Mr. Keown acknowledged during cross-examination that in a typical central office, SBC would have space to fit 20 OCDs (2 OCDs in each of 10 racks).[18]

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[17] CA Line Sharing Proceeding, Hearing Tr. (Keown), at 15408:2-6, 15410:11-15, attached to Letter from Kimberly Scardino, WorldCom, to Secretary Dortch, CC Docket No. 01-338, dated July 17, 2002, as Attachment 13.

[18] CA Line Sharing Proceeding, Hearing Tr. (Keown), at 15408:2-6.

34. SBC also claims that providing CLECs higher throughput rates on ATM QoS classes other than unspecified bit rate ("UBR") would cause capacity exhaust. In particular, SBC opposes offering Constant Bit Rate ("CBR") PVCs based on its claim that "large" CBR PVCs would prematurely exhaust the throughput capacity of the fiber feeder systems deployed as part of Project Pronto. We note that SBC announced to the CLEC community its plans to support CBR PVCs as far back as October 2000. However, there is no technical basis for SBC's arbitrary limitation of CBR PVCs to 96 Kbps. Indeed, Alcatel supports CBR PVCs whose only bandwidth limit is the overall limit of the DSL circuit itself. Moreover, Litespan throughput capacity is easily expandable, and SBC's own witnesses Mr. Keown and Mr. Boyer have acknowledged to state regulators that there are currently no capacity constraints on the system because the OC3c subloops from the RT to the OCD are expected to be lightly loaded. Even if *all* the DSL ports on a Litespan NGDLC were used to provide customers with a CBR circuit, the NGDLC could provide a 600 kilobyte per second CBR PVC to each customer: far in excess of the 96 kilobytes per second SBC is offering.[19]

35. Furthermore, even if the capacity of the Litespan begins to be consumed, there are numerous means to increase the capacity. A common initial configuration of the Litespan ADSL NGDLC platform is to "daisy chain" all the ADSL-capable Channel Bank Assemblies together, to feed a single OC-3c fiber-based signal between the RT and the central office. As

[19] Each Litespan CBA can support 56 line cards. Assuming quad ADLU line cards (4 DSL ports per line card is the capacity of the current generation of Alcatel ADLU line cards), each CBA can support 224 DSL ports. SBC has stated that, of the 155 Mbps bandwidth of an OC-3c, approximately 135 Mbps is available as usable bandwidth (SBC claims it needs 20 Mbps for "overhead"). Taking this usable bandwidth as a given value for discussion purposes (we note, however, that we do not agree that the useful bandwidth on an OC-3c is only 135 Mbps), if one divides 135 Mbps by 224 CBR PVCs, each CBR can be at least 600 kbps.

bandwidth demand increases the ILEC can increase capacity by removing the daisy chain configuration. Unchaining three ADSL Channel Bank Assemblies in an RT would triple the throughput capacity for ADSL, from 155 Mbps to 465 Mbps. Accordingly, it is technically feasible for SBC to provide CBR service at bandwidths far in excess of the ILEC's artificial 96 kilobytes per second limitation.

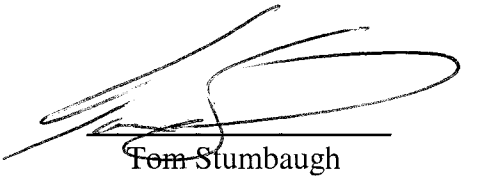
36. Although each unchained Channel Bank Assembly would then need separate fibers running between the NGDLC in the RT and the central office, SBC's witnesses in state proceedings have acknowledged that the ILEC is deploying massive amounts of fiber as part of Project Pronto, and will have ample unused fiber to support individual CBAs. SBC's Project Pronto fiber feeder cables are typically deployed with 216 or more fibers on each of the standard four (North, South, East, West) feeder routes from the CO.[20] Furthermore, the bandwidth of fiber optic cables can be expanded almost without limit in a variety of ways, including increasing the transmission rate of the electronics at both ends of the fiber system, and the deployment of wave division multiplexing and dense wave division multiplexing, which derive additional bandwidths on the same fiber system by using lasers that transmit and receive at multiple wavelengths of light simultaneously.

[20] CA Line Sharing Proceeding Hearing Tr., at 15410-12.

Declaration

I declare under penalty of perjury that the foregoing is true and correct.

Executed on July 11th, 2002.



~~Tom~~ Stumbaugh

Declaration

I declare under penalty of perjury that the foregoing is true and correct.

Executed on July 11, 2002.

David Reilly

Declaration

I declare under penalty of perjury that the foregoing is true and correct.

Executed on July 11, 2002.

William M. Drake